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CITRUS INSECT CONTROL FOR SUMMER, 1959

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Florida Lemons

An Editorial

Members of the staff of the Citrus Experiment Station at Lake Alfred have prepared a series of five articles on the subject of the development of Florida lemons as a commercial enterprise.

Two of these articles appeared in the April issue of The Citrus Industry, and another one appears in this month's magazine.

There was a time prior to the Great Freeze of 1894-95 when Florida produced a considerable volume of lemons, but since that time the major portion of the nation's lemons have been grown in California.

The articles referred to are devoted to the potential lemon market for Florida lemons, the selection of the proper stock and many other factors dealing with the subject.

All of which is a most worth while enterprise in view of Florida's dominance in the citrus production field. Already some 3000 acres are planted to lemons in Florida. We predict that after the Experiment Station's reports are read by Florida's growers that a marked increase in lemon plantings will take place in this state by our growers who are alert to new sources of income from citrus.

VOL. 40 — NO. 5 MAY, 1959 BARTOW, FLORIDA

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Citrus Insect Control For Summer 1959

W. L. Thompson

W. L. Thompson
W. A. Simanton
R. B. Johnson

W. A. Simanton

Florida Citrus
Experiment Station
Lake Alfred,
Florida

R. B. Johnson

Red scale began to dominate the pest picture in September 1958 and will continue at a high level through the summer period. Infestations now occur in half of the survey groves. Light infestations may be expected to become heavy infestations this fall unless summer control is undertaken.

Melanose infection is high on new leaves as a result of prolonged rains that occurred in March. Much of the new fruit also was marked by melanose before the post-bloom copper spray could be applied.

Purple scale generally has been at a low level although nearly all groves have some of this scale present. Infestations are increasing but are expected to remain below average through the summer.

Purple mite and Texas citrus mite are presently below average intensity due largely to abundant rains. If dry weather occurs in May, rapid build-up will follow. Several injurious populations of six-spotted mite were reported in April. A few more will be seen in May, but all infestations of this mite will drop to a very low level in June.

Rust mite infestations have been average for the past two months. A rapid increase is expected to start about the first of June.

Mealybugs will be scarce except in occasional groves, whereas whiteflies are likely to be more abundant than usual until July.

SPRAY PROGRAM

A summer spray, primarily for control of scale insects and rust mites, is one of the basic applications of the year. There are several factors to be considered for satisfactory results. These include selection of the most suitable insecticide for each grove and pest to be controlled, timing of the spray, and thoroughness of coverage. Thorough coverage is as important as the insecticide because most of the scale and all of the whitefly larvae are on the under surface of the leaves, and because all of the rust mite miticides, except sulfur, have no fumigative effects. They must contact the mite to be effective.

Scale Control: Since purple scale is at a fairly low level and red scale is at a high level which is expected to continue, the scalicide application should be timed for red scale control where this scale is a problem. The most satisfactory red scale control is obtained when the scalicide is applied in July or early August. Even where a post-bloom scalicide has been applied, the July or early August period for the second scalicide is preferred. Where it is not possible to spray the whole acreage in July, it is suggested that light infestations be sprayed in late June and heavier infestations sprayed in July. The timing of the scalicide is not so critical for purple scale, especially where a post-bloom scalicide was applied, but best results may be expected where treatment is made from mid-June through July. On all varieties, especially tangerines and early oranges and grapefruit, the scalicide should be applied before the fruit is infested, so it will be free of green spots when the fruit is picked.

Oil emulsion at 1.3 percent oil is an effective scalicide and will also control purple mite and reduce greasy spot. However, there are several disadvantages to oil. It should not be applied during dry weather or to trees that are weak from other causes because it will produce a leaf-drop. Oil also depresses the soluble solids in the juice and the later in the summer it is applied (August and September), the more likely it is to affect solids. This may be especially important this year because solids are low in years of excessive rainfall in the spring and summer months. There has been an abnormally large amount of rainfall this spring. If there is the normal or above normal amount of rain through the rest of the spring and summer, solids may be low and nothing should be done to cause any further reduction. A late summer oil may also retard degreening of tangerines and early varieties of oranges and grapefruit. Color is very important on tangerines. If oil is applied to tangerines, the concentration of oil should not exceed 1 percent and the spray should not be applied later than July 15. It would be better not to use oil on tangerines since parathion and malathion are also

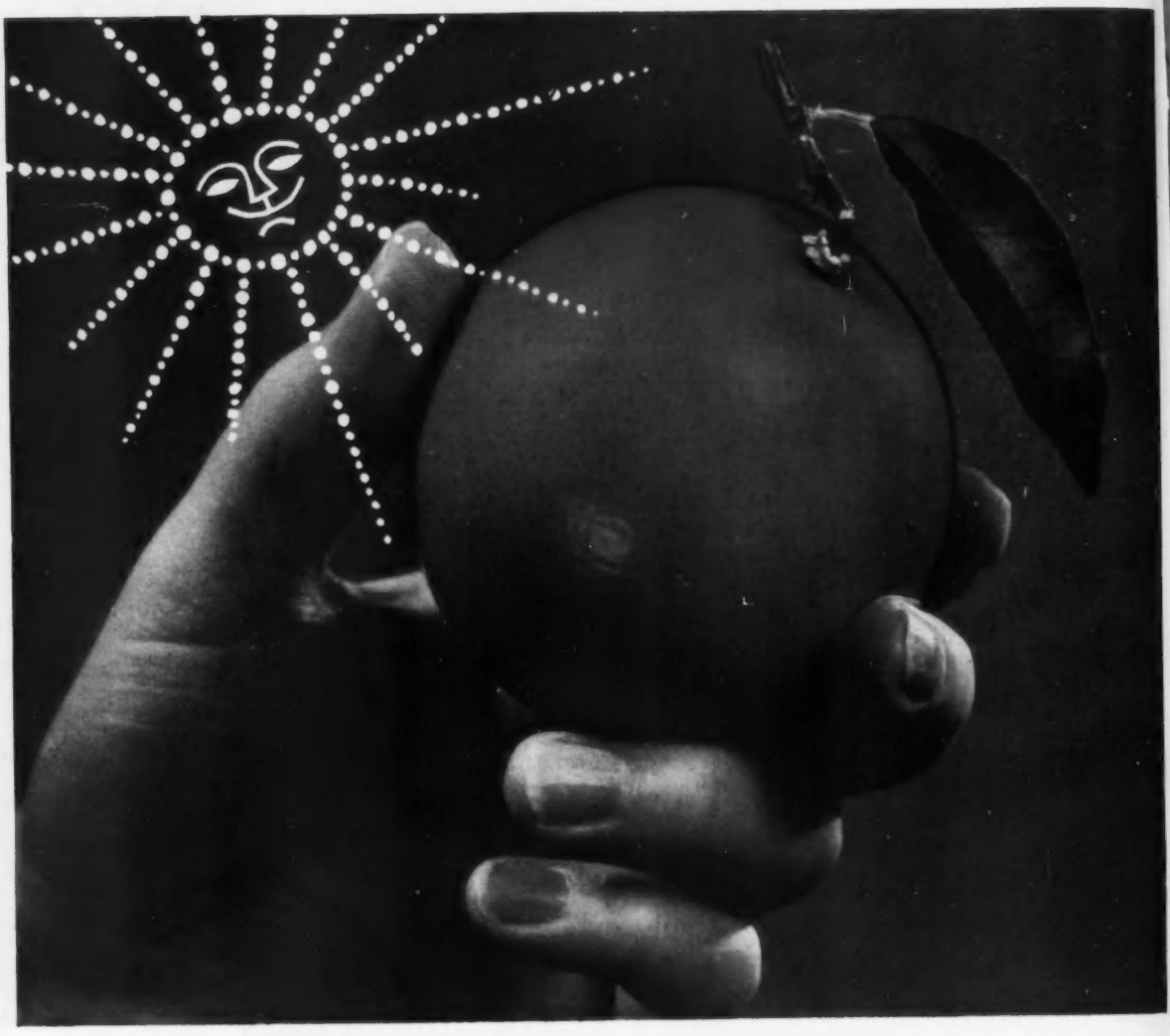
(Continued on page 15)

SCALE AND MITE ACTIVITY BY DISTRICTS *

District	Purple Scale	Red Scale	Purple Mite	Rust Mite on leaves
West Coast	2.60	3.22	.55	1.60
Indian River	3.76	4.09	.95	.47
Upper East Coast	4.30	—.12	1.51	.50
Gainesville	3.25	0	—.20	0
Orlando	2.75	2.56	1.29	.36
Brooksville	3.07	.13	1.47	.62
Ridge	4.15	4.63	1.60	1.47
Bartow	3.90	3.03	.78	1.57
State Average	3.42	3.40	1.14	.82
Last Year	3.95	3.14	1.62	.97

* Second week in April. Activity is computed from populations, amount of hatching of scales, and number of groves with increasing or decreasing infestations. Activity is considered high if above 4.0 for purple scale, 3.0 for red scale, and 1.5 for mites.

* Written April 20, 1959. Reports of surveys by Harold Holtsberg, Fort Pierce; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. M. Sutton, Lake Alfred.



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Burgundy...A New Variety of Grapefruit

DR. E. J. DESZYCK*

A new and distinct variety of grapefruit originating as a bud sport on a Thompson pink seedless grapefruit tree was discovered during 1943-44 in Saint Lucie County by Hudson J. McReynolds and Oliver L. Peacock. By budding trees from this sport the discoverers reproduced the new variety in numerous trees which were true in all respects to the original. The first tree bearing the bud sport does not exist today. McReynolds and Peacock (1) patented this variety in 1954, and named it Burgundy.

* Citrus Experiment Station, Lake Alfred, in cooperation with Florida Citrus Commission.

(1) United States Patent Office, Plant Patent 1276, issued May 11, 1954.

At the present time, about 300 acres of this grapefruit have been planted, most of the trees being under eight years old.

This article reviews the color characteristics of the Burgundy grapefruit and presents some preliminary results of fruit quality and physical properties of the new variety grown on two rootstocks.

According to the patent, the most distinctive feature of the Burgundy variety is the deep red appearance of the fruit flesh. It is claimed that the color is deeper red than that of either Ruby Red or Thompson pink seedless variety, and that the Burgundy fruit retains its deep color as long as it remains on the tree. Unlike the Ruby Red, the Burgundy grapefruit shows no red blush on the rind; that is, the color is restricted to the flesh, juice sacs, and segment walls. Further description of the Burgundy fruit and tree are included in the plant patent (1).

Growers and processors have shown considerable interest in this new grapefruit variety. Therefore, some preliminary results of fruit quality and physical characteristics of Burgundy grown on sour orange and rough lemon rootstocks were obtained and are presented in Table 1. A complete report of the seasonal change in fruit quality will be made at the end of the current season. In the table each value is the average of 12 individual fruit of size 126 (diameter — 3.5 inches) picked from 12 trees on November 5, 1958. These trees are approximately eight years

DR. S. V. TING*

old, and have not been sprayed with arsenic for early maturity. The Burgundy trees on sour orange and rough lemon rootstocks are planted on beds in one grove in the Fort Pierce area.

These preliminary results indicate that the Burgundy grapefruit failed to meet legal maturity standards in early November. On rough lemon rootstock, the Burgundy fruit attained a passing ratio of soluble solids to acid but lacked adequate soluble solids. However, on sour orange rootstock, this grapefruit attained the soluble solids content yet failed in ratio. On either rootstock, the Burgundy grapefruit contained insufficient juice volume necessary for

(Continued on page 19)

PART III.

Finding The Best Lemon For Florida ... A Report Of Progress[1]

III. Evaluation of Coldpressed Florida Lemon Oil And Lemon Bioflavonoids

By J. W. KESTERSON and R. HENDRICKSON
FLORIDA CITRUS EXPERIMENT STATION, LAKE ALFRED

R. HENDRICKSON

J. W. KESTERSON

COLDPRESSED FLORIDA LEMON OIL

Introduction

Lemon oil of acceptable quality is currently selling at $4.00 per pound; at this price the gross return on a box of fruit would amount to approximately 75 cents to $1.00 for the oil alone. Thus, it is apparent that quality of oil is an important consideration in the selection of varieties. In some years the proceeds from the oil might spell the difference between profit and loss.

From the standpoint of market acceptance as an essential oil, lemon oil should meet certain requirements including those specified in the United States Pharmacopoeia. It should have a high aldehyde content and from a flavor standpoint it should be a rich full-bodied oil with a definite citral effect. Moreover, for a profitable operation the variety selected for planting should be a lemon that would give a high yield of oil.

Experimental Procedure

Oil samples were extracted in the Citrus Experiment Station Pilot Plant as described in Part II of this series. The oil emulsion from the juice extractor was collected and passed through a model No. 35 Deluxe Grade Super Juice Finisher with manual discharge adjustment. A screen with 0.033-inch perforations and head clearance set at 0.024 to 0.026 inch was used to remove gross particles of pulp.

The liquid discharged from the finisher was collected in a 50-gallon stainless steel tank and allowed to stand for a period of 3 to 5 hours so that the oil emulsion would rise to the top of the tank. The bottom 80 per cent of the tank contents were discharged to the drain and the oil emulsion retained. The emulsion was then passed over an 80-mesh shaker screen to remove fine particles of pulp. The emulsion was then put through a laboratory model Sharples Super Centrifuge with a bowl speed of 25,000 r.p.m. in order to break the emulsion and free the oil.

The residue from the centrifuge bowl was collected and mixed with the fine pulp particles obtained from the shaker screen. To this mixture standard super cel was then added, and the mixture subjected to hydraulic pressure for the recovery of an oil emulsion, which in turn was centrifuged to obtain the free oil phase. The oil obtained from the emulsion and bowl cake were combined to give the finished coldpressed lemon oil sample.

Results and Discussion of Results

The physical and chemical properties of the samples of coldpressed lemon oils produced are presented in Table 1.

Freeze Damage.- Oils 36 and 37 were produced from fruit that had been exposed to a one-night freeze on December 11. Oils 38, 39, and 40 were produced from fruit that had been exposed to freezes on the nights of December 11 and 12. The data presented in Table 1 indicated that these freezes had no deterimental effect on the physical and chemical characteristics of the oil.

Oil Recovery from Centrifuge Bowl Cake.- It was observed that when the emulsion was difficult to break the percentage of oil recovered from the bowl cake exceeded 6 or 7 per cent. Consequently, it was an easy matter to pick out those lemon selections that processed easily.

Aldehyde Content, Yield, and Quantity of Aqueous Phase.- Although each sample consisted of a different selection, the oil quality was strongly associated with amount of oil obtained (yield) compared to amount of aqueous phase (a relatively constant amount in these runs) used in processing. When yield of oil was low, a low proportion of oil to aqueous phase resulted (Fig. 3), and a low aldehyde content was found in the oil (Fig. 1). This relationship may also be expressed inversely as a low aldehyde content of oil associated with high proportion of aqueous phase used in processing (Fig. 2). Some lemon selections were apparently rich in oil, while others were poor. It is evident that to produce a lemon oil of high aldehyde content, the amount of aqueous phase allowed to come in contact with the oil during processing should be reduced to as small a quantity as is practical under operating conditions. These relations involving processing procedures

[1] Florida Agricultural Experiment Station Journal Series No. 818 Presented at Florida State Horticultural Society Meeting in Clearwater, October, 1958.

are clearly evident although selection differences also exist.

One exception might be due to large or non-uniform fruit that was difficult to feed into the juice extractor. Such fruit would require a large quantity of aqueous phase to produce a given quantity of oil. An unusually large quantity of aqueous phase might indicate that the fruit variety in question was difficult to process. In one instance the yield of oil was very poor which resulted in a high ratio of aqueous phase to oil. The outstanding example of this was with the Meyer lemon. However, such lots of fruit were the exception rather than the rule and from a commercial standpoint this would not be a problem.

Kesterson and Hendrickson (4) have shown that the aldehyde content of orange oil is lowest in early season fruit. It increases in mid-season fruit and is highest in oil produced from Valencia oranges. Hood (3) has shown that there is a wide variation in the yield of oil obtained from Florida oranges. However, the trend in yield parallels that for the aldehyde content. This is also true for the commercial production of orange oil.

On this basis it appears that fruit which produces a high yield of oil will also produce an oil which is high in aldehyde content. This relationship between aldehyde content and yield has never been previously reported. Further work will be necessary before this relationship can definitely be established.

Oil Evaluation.- The physical and chemical properties used as a criterion of purity for coldpressed lemon oil are shown in Table 2 and may be used as a basis for evaluating the quality of the oil samples prepared from the 42 lemon selections.

(Continued on page 9)

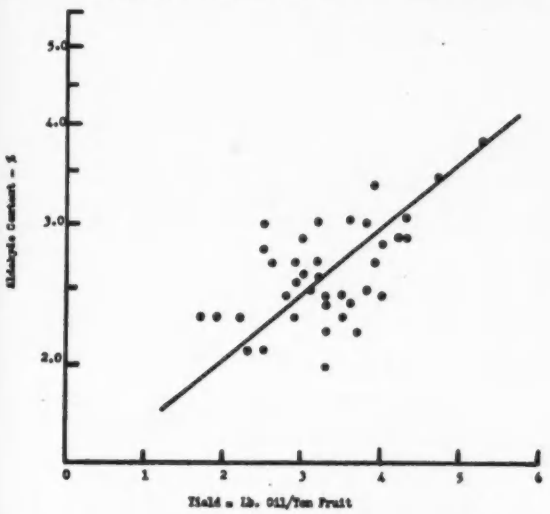


Fig. 1. Scatter diagram to show the relationship between aldehyde content and yield of oil.

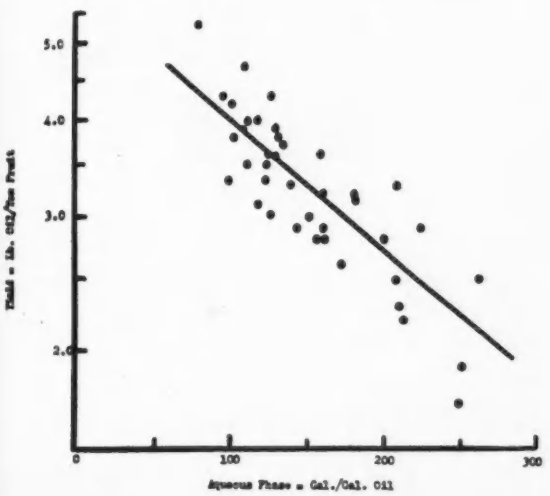


Fig. 2. Scatter diagram to show the relationship of aldehyde content to the aqueous phase.

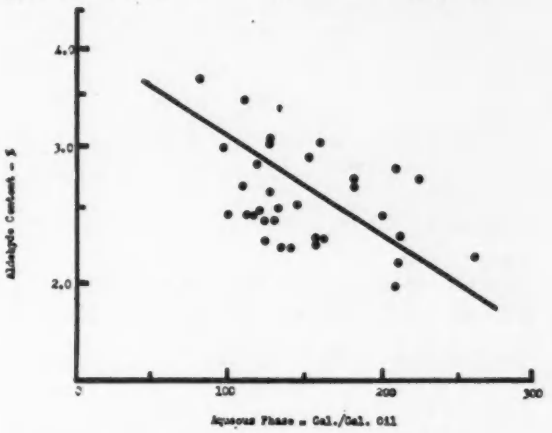


Fig. 3. Scatter diagram to show the relationship of yield of oil to aqueous phase.

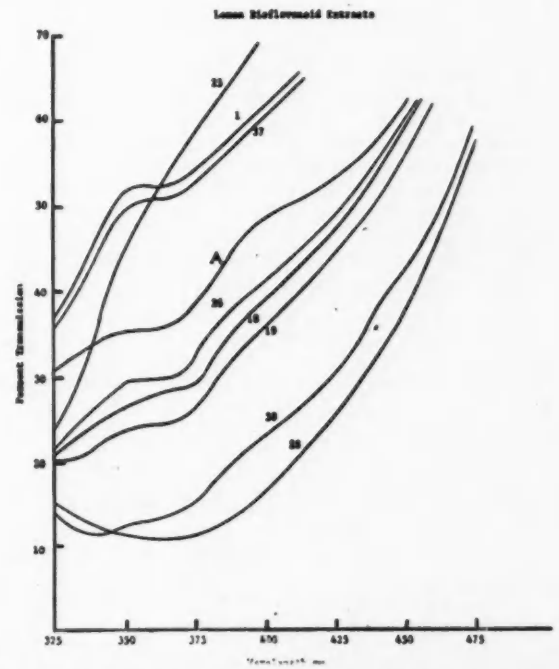
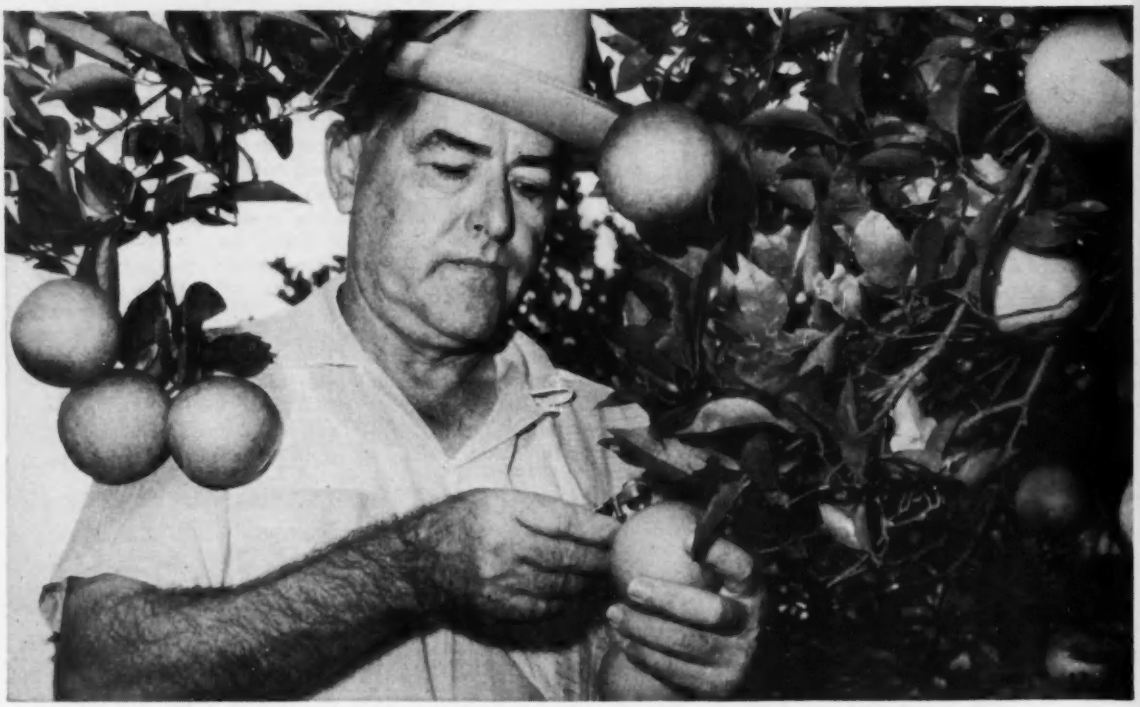


Fig. 4. Comparison of bioflavonoid extracts by Davis test at various wave lengths. Dilution of samples 1, 18, 19, 25, 26, 28, 30, 37, and A was respectively 3, 4, 4, 24, 4, 10, 10, 2, and 4 grams per 500 ml. of 0.2 N sodium hydroxide.



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FINDING THE BEST LEMON FOR FLORIDA ... A REPORT OF PROGRESS

(Continued from page 7)

In Table 3 the aldehyde content in order of increasing value is presented for 42 samples of lemon oil. The yield of oil in pounds per ton of fruit in order of increasing value is presented in Table 4 for these same oils. It can be seen from these tables that 18 of the lemon selections studied yielded an oil which failed to meet the specifications of the United States Pharmacopoeia. Twenty-four of the lemons evaluated gave an oil that met the specifications outlined in Table 2.

The 10 best lots of Florida lemon oil selected from these 24 on the basis of aldehyde content and yield of oil are summarized in Table 5. From the standpoint of aldehyde content the 10 best lemons are as follows: Sicilian, Bearss No. 1, "M" Lemon, Bearss No. 2, Italian, Citrus Experiment Station III Row G-5, Villafranca, Des 4 Saison, Harvey No. 2, and Sexton No. 2. From the standpoint of oil yield the 10 best lemons are as follows: Sicilian, Bearss No. 1, Bearss No. 2, Des 4 Saison, Sexton No. 2, Corregia, "M" Lemon, Villafranca, Italian, and Moreland.

These same 42 lemon oil selections were submitted to a large essential oil company for an organoleptic evaluation. From a careful organoleptical examination the oil samples were evaluated as follows:

Sample No. 26 - Italian - This is a rich full bodied oil with a definite citral effect, and we feel that this represents the best commercial type submitted.

Sample No. B - Sicilian - While this sample showed a higher citral content by analysis than No. 26 it was less pronounced on organoleptical examination. We would classify this oil as our second choice.

We would then group sample No. 8 - Bearss No. 1, sample No. 11 - Bearss No. 2, sample No. 27 - "M" lemon, and sample No. 31 - Villa-

Table 2. The physical and chemical properties used as a criterion of purity for coldpressed lemon oil.

	U.S.P. XIII		Italian		California	
	Min.	Max.	Min.	Max.	Min.	Max.
Specific gravity 25°C/25°C	0.849	0.855	0.849	0.855	0.849	0.855
Refractive index n_D^{20}	1.4740	1.4755	1.4742	1.4755	1.4742	1.4755
Difference	Not less than 0.0010 and not more than 0.0027 lower than original oil.					
Optical rotation α_D^{25}	+57°	+65.6°	+57°	+65.36°	+57°	+65.36°
Difference	Not more than 6° less than original oil		——	——	——	——
Aldehyde content - %	——	——	3.7	5.0	2.3	2.8
Evaporation residue - %	——	——	1.5	2.2	1.5	1.8
U. V. Spectrum 315 Mu log E 0.25g 100 cc						
CD	——	——	0.49	0.96	0.23	0.74
Peak	——	——	1.00	1.70	0.53	1.50

Table 1. The physical and chemical properties of coldpressed lemon oil.

Selection No.	Specific gravity 25°C/25°C	Refractive index n_D^{20}	Refractive index of 10% distillate n_D^{20}	Difference	Optical rotation α_D^{25}	Optical rotation of 10% distillate α_D^{25}	Difference	Aldehyde content %	Evaporative residue %	U. V. Spectrum 315 mu log E 0.25g 100 cc		
										CD	Peak	Mu
1	0.849	1.4744	1.4729	0.0015	+63.18	+59.58	-3.60	2.31	2.6	0.43	0.94	312.5
2	0.850	1.4745	1.4729	0.0016	+63.22	+60.22	-3.00	2.13	2.4	0.47	0.96	312
3	0.850	1.4743	1.4729	0.0014	+62.67	+59.27	-3.40	2.32	2.0	0.40	0.84	315
4	0.849	1.4742	1.4729	0.0013	+63.91	+61.31	-2.60	2.31	2.1	0.41	0.82	315
5	0.849	1.4743	1.4729	0.0014	+62.62	+60.22	-2.40	2.68	2.2	0.48	0.92	315
6	0.850	1.4742	1.4730	0.0012	+62.07	+58.38	-3.69	2.54	2.0	0.42	0.86	312.5
7	0.849	1.4741	1.4730	0.0011	+60.67	+58.58	-2.09	2.31	1.9	0.35	0.74	315
8	0.850	1.4742	1.4731	0.0011	+60.98	+58.82	-2.16	3.45	1.9	0.44	0.86	315
9	0.850	1.4743	1.4731	0.0012	+61.98	+58.82	-3.16	2.63	2.1	0.46	0.89	315
10	0.850	1.4742	1.4729	0.0013	+60.85	+59.22	-1.63	2.90	2.0	0.39	0.82	315
11	0.850	1.4741	1.4729	0.0012	+60.58	+56.98	-3.60	3.08	2.0	0.38	0.83	315
12	0.849	1.4740	1.4729	0.0011	+62.02	+58.42	-3.60	2.27	1.9	0.28	0.66	315
13	0.849	1.4740	1.4728	0.0012	+66.07	+63.67	-2.40	2.73	2.0	0.23	0.72	315
14	0.849	1.4740	1.4729	0.0011	+63.51	+60.51	-3.00	2.45	1.9	0.33	0.72	315
15	0.849	1.4740	1.4728	0.0012	+64.58	+60.18	-4.40	2.28	2.0	0.32	0.74	315
16	0.849	1.4740	1.4729	0.0011	+63.58	+59.98	-3.60	2.27	2.0	0.36	0.75	315
17	0.848	1.4740	1.4728	0.0012	+63.82	+60.02	-3.80	2.72	2.0	0.31	0.68	315
18	0.848	1.4740	1.4728	0.0012	+64.87	+62.07	-2.80	1.99	2.1	0.37	0.76	315
19	0.849	1.4740	1.4728	0.0012	+63.91	+60.51	-3.40	2.45	2.1	0.34	0.72	315
20	0.849	1.4740	1.4728	0.0012	+62.80	+59.80	-3.00	2.45	1.9	0.35	0.73	315
21	0.849	1.4739	1.4728	0.0011	+63.65	+60.45	-3.20	2.99	1.8	0.33	0.72	315
22	0.848	1.4739	1.4728	0.0011	+65.22	+62.42	-2.80	2.27	1.7	0.22	0.52	315
23	0.849	1.4740	1.4729	0.0011	+57.82	+55.42	-2.40	2.17	1.9	0.28	0.67	315
24	0.848	1.4739	1.4728	0.0011	+65.20	+63.00	-2.20	2.45	1.9	0.34	0.74	315
25	0.848	1.4743	1.4725	0.0018	+68.98	+74.78	+5.80	3.00	3.0	0.25	0.66	315
26	0.849	1.4740	1.4729	0.0011	+61.78	+59.14	-2.64	3.04	1.7	0.26	0.65	315
27	0.849	1.4740	1.4729	0.0011	+60.58	+57.94	-2.64	3.37	1.7	0.27	0.66	315
28	0.848	1.4739	1.4729	0.0010	+61.58	+57.53	-4.05	2.41	1.7	0.27	0.65	315
29	0.848	1.4739	1.4728	0.0011	+63.18	+59.33	-3.85	2.67	1.7	0.31	0.70	315
30	0.848	1.4738	1.4728	0.0010	+61.02	+62.11	+1.09	2.86	1.6	0.22	0.57	315
31	0.849	1.4740	1.4728	0.0012	+64.02	+60.74	-3.28	3.03	1.7	0.24	0.60	312
32	0.848	1.4740	1.4728	0.0012	+66.62	+65.34	-1.28	2.22	1.7	0.26	0.56	315
33	0.849	1.4740	1.4728	0.0012	+63.67	+60.94	-2.73	3.03	1.7	0.26	0.64	315
34	0.848	1.4740	1.4728	0.0012	+65.47	+63.38	-2.09	2.23	1.6	0.23	0.56	315
35	0.849	1.4740	1.4728	0.0012	+62.42	+58.98	-3.44	2.58	1.8	0.30	0.69	315
36	0.848	1.4741	1.4728	0.0013	+65.38	+62.86	-2.52	2.41	1.7	0.20	0.55	315
37	0.849	1.4741	1.4728	0.0013	+62.38	+60.18	-2.20	2.85	1.8	0.28	0.72	315
38	0.849	1.4741	1.4728	0.0013	+62.02	+59.38	-2.64	3.02	2.0	0.37	0.82	315
39	0.849	1.4740	1.4728	0.0012	+65.22	+62.82	-2.40	2.50	1.8	0.30	0.49	320
40	0.849	1.4740	1.4728	0.0012	+62.02	+59.62	-2.40	2.49	1.9	0.37	0.65	315
A	0.848	1.4749	——	——	+82.62	——	——	0.45	3.4	0.61	1.10	325
B	0.849	1.4742	1.4726	0.0016	+63.04	+61.44	-1.60	3.66	2.1	0.45	0.91	315

franca as representing our third choice.

LEMON BIOFLAVONOIDS

Introduction

Bioflavonoid is a term commonly used to describe a group of flavanone compounds that possess biological activity. These substances are prevalent in citrus fruits. They maintain the normal conditions in the walls of the small blood vessels (5) and are considered to have a physiological effect on the human system that parallels that of a vitamin.

Citrus bioflavonoid derivatives are a chemical possibility and lemon bioflavonoid complex is currently selling for $9.00 per pound. It is possible that a recent renewal of interest in these compounds could make them an important factor in the production of lemons. Therefore, the principal purpose of this study was to determine the potential quantity of bioflavonoids that could be recovered from lemons.

Experimental Procedure

The lemons were processed through a Food Machinery In-line juice extractor. A representative sample of the ejected peel and rag was then comminuted in a Fitzpatrick comminuter to pass a one-half inch screen. A 4,000 gram sample of this comminuted peel was immediately processed for its bioflavonoid content. In each case 6,000 ml of water was added to 4,000 grams per peel. This mass was continually stirred for one hour at pH 10.5 to 10.8 which pH was obtained by small additions of calcium hydroxide. It was stirred an additional 15 minutes at pH 11.0 after which the mass was hydraulically pressed and the clear press liquor was adjusted to pH 5.0 with concentrated hydrochloric acid. The total amount of liquor pressed out was weighed and a 250 ml. portion was concentrated five times and stored at 40° F. for later chromatiographic and ultraviolet analysis. The remainder of the expressed and neutralized press liquor was processed to recover a crude hesperidin or bioflavonoid complex. This was accomplished by heating the liquor to 55° C. and stirring for two hours with 30 grams of filter cel. The sample was filterd the following day, the residue was dried at 105° C. and ground to pass a 28-mesh screen. This final product was analyzed by the Davis (1) procedure.

A few samples of the crude hesperidin or bioflavonoid complex were further analyzed under visible and ultraviolet light. Selection Nos. 1, 18, 19, 25, 26, 28, 30, 37, and A were dissolved at various concentrations in 0.2 N sodium hydroxide and diluted with 90 per cent diethylene glycol and 4 N alkali as in making the Davis test. The samples

(Continued on page 17)

Table 3. Aldehyde content in order of increasing value for 42 lots of Florida lemon oil.

Aldehyde - %	Sample No.
0.0 - 1.0	(A)
1.0 - 2.0	(18)
2.0 - 2.1	—
2.1 - 2.2	(2) - 23
2.2 - 2.3	12 - 15 - 16 - (22) - (32) - (34)
2.3 - 2.4	(1) - 3 - 4
2.4 - 2.5	14 - 19 - 20 - (24) - (28) - (36) - 40
2.5 - 2.6	(6) - 35 - 39
2.6 - 2.7	5 - 9 - (29)
2.7 - 2.8	(13) - (17)
2.8 - 2.9	7 - (30) - 37
2.9 - 3.0	10 - 21
3.0 - 3.1	11 - (25) - 26 - (31) - 33 - 38
3.1 - 3.2	—
3.2 - 3.3	—
3.3 - 3.4	27
3.4 - 3.5	8
3.5 - 3.6	—
3.6 - 3.7	B

( ) - Sample numbers in parentheses did not meet the specifications of the United States Pharmacopoeia.

Table 4. Yield of oil in pounds per ton of fruit in order of increasing value for 42 lots of Florida lemon oil.

Lbs. oil/ton fruit	Selection No.
0.0 - 0.5	(A)
0.5 - 1.0	—
1.0 - 1.5	—
1.5 - 2.0	(1) - 3
2.0 - 2.5	(2) - 4
2.5 - 3.0	5 - (6) - 7 - 12 - (13) - 15 - 16 - 23 - (24) - (25)
3.0 - 3.5	9 - 10 - (17) - (18) - 20 - (28) - (32) - 33 - 35 - 40
3.5 - 4.0	14 - (22) - 26 - 27 - (29) - (31) - (34) - (36) - 38 - 39
4.0 - 4.5	11 - 19 - 21 - (30) - 37
4.5 - 5.0	8
5.0 - 5.5	B

( ) - Sample numbers in parentheses did not meet the specifications of the United States Pharmacopoeia.

Table 5. The 10 best lots of Florida lemon oil on the basis of aldehyde content and yield of oil.

Aldehyde content		Yield of oil	
%	Selection no.	Lbs./ton fruit	Selection no.
3.66	B*	5.3	B*
3.45	8*	4.7	8*
3.37	27*	4.3	11*
3.08	11*	4.3	21*
3.04	26*	4.0	37*
3.03	33	4.0	19
3.02	38*	3.9	27*
2.99	21*	3.8	38*
2.90	10	3.6	26*
2.85	37*	3.5	14

* - Sample number appears twice in this table.

Table 6. Hesperidin extraction data for 42 selections of lemons with arrangement order in accordance with hesperidin yield.

						Raw lemon juice	
Selection no.	Yield[1] grams	$Ca(OH)_2$ grams	HCl ml.	Crude hesperidin grams	% hesperidin in extract	° Brix	% Acid
31	19.0	84	50.0	59.4	31	8.69	6.13
37	18.7	85	55.0	54.9	37	8.14	5.88
24	18.2	71	48.0	60.5	33	8.22	5.77
19	18.2	84	57.0	60.8	30	8.26	5.46
22	17.2	86	54.5	59.4	29	8.34	5.88
12	17.2	72	46.5	57.5	30	8.20	5.78
21	16.9	92	64.0	58.4	29	7.94	5.92
26	16.6	70	41.0	57.2	29	7.78	5.56
18	16.5	79	51.0	55.0	30	7.76	5.44
17	16.3	80	51.0	60.3	27	8.22	5.77
5	16.2	63	44.0	62.5	26	8.10	5.73
11	16.1	76	50.0	53.6	30	8.30	6.00
8	15.9	65	50.0	56.9	28	8.24	5.84
20	15.5	88	56.0	57.4	27	7.94	5.84
33	15.4	90	56.5	54.9	28	9.24	6.40
10	15.4	62	45.5	55.1	28	7.63	5.31
9	14.8	64	47.0	59.3	25	8.12	5.68
34	14.7	80	45.5	57.5	26	8.86	5.99
38	14.4	88	52.0	80.0	18	8.63	5.94
35	14.3	87	53.0	62.3	23	8.67	6.07
7	14.1	61	44.0	52.1	27	7.30	5.16
6	14.0	60	42.0	58.2	24	8.10	5.75
13	13.3	67	44.0	57.6	23	8.30	5.70
15	13.1	72	48.0	54.5	24	7.88	5.55
32	13.1	84	56.0	52.5	25	8.42	5.82
2	12.8	60	44.0	58.3	22	8.07	5.58
3	12.4	54	40.0	59.0	21	7.44	5.33
23	12.4	80	51.0	54.0	23	8.14	5.34
39	12.4	84	46.0	62.2	20	8.59	5.60
40	12.4	87	47.0	82.4	15	8.66	6.01
A	12.0	88	44.0	79.7	15	—	—
B	12.6	90	46.5	57.8	20	—	—
14	11.6	70	46.0	55.5	21	8.20	5.76
16	11.4	78	48.0	54.4	21	7.65	5.40
4	11.3	61	39.0	59.4	19	7.80	5.60
1	10.8	60	38.0	54.0	20	8.02	5.26
29	10.5	83	56.0	58.1	18	8.48	6.10
27	10.4	79	48.0	61.3	17	8.72	6.13
36	10.4	84	52.0	52.0	20	9.10	6.16
28	8.8	84	52.5	58.6	15	8.49	6.14
30	8.5	82	47.0	65.5	13	8.88	6.08
25	2.8	77	41.0	56.2	5	8.64	6.41

1 Yield in grams divided by two equivalent to pounds per ton of peel.

The Economic Limit Of Florida's Capacity

By MARSHALL R. GODWIN
PROFESSOR OF MARKETING, DEPARTMENT OF AGRICULTURAL ECONOMICS, UNIVERSITY OF FLORIDA

A few days before Christmas last winter, chilling winds from the north suddenly and sharply curbed the rapid increase in Florida citrus production that had become characteristic of the post-war years. The 116.6 million box crop of citrus fruits produced in Florida during the 1957-58 season was 19 million boxes below production a year earlier. The relentless hand of the elements fell with equal force on both orange and grapefruit production. During the past season, orange production in Florida totaled 82.5 million boxes. This was 10.5 million boxes less than our production a year earlier, and was in sharp contrast to the upward surge in orange production at an average annual rate of 4.3 million boxes per season which we had experienced since 1945-46. Grapefruit production during the past season amounted to 31.1 million boxes. This was 6.3 million boxes less than we produced a year previously, and was the smallest crop since 1950.

While the successive waves of cold weather which swept across the citrus area of Florida last winter spelled disaster for some, the bright sunlight of last spring revealed that the industry as a whole suffered little, if any, loss. Prices and returns for the undamaged part of the citrus crop moved upward to levels undreamed of a few months earlier when the season began. In an industry sense, a calamity during the winter miraculously transformed itself into a windfall gain in the spring. The aftermath of the cold weather of last winter did not bring despair and disorder. Instead, the industry now stands on the threshold of a new season, eargerly anticipating high prices and good returns.

In the current atmosphere of optimism prevailing in the Florida citrus industry, it seems almost unkind to bring up the long run problems which the industry must face. The hard facts are, however, that the fundamental economic issues confronting the industry a year ago emerge unscathed from the freezes of last winter.

There is much speculation and conjective concerning the size of the citrus crop for the coming season. Wide differences of opinion can be found as to how long it will take the industry to recover fully from the ravages of the cold last winter. There are many shades of opinion as to the nature of our production pattern during the recovery period. But it is difficult to find anyone in the industry who questions the ability of the industry to recover eventually, and nothing can be found in the actions and the attitudes of growers or marketing agencies that would lead one to believe that our production will not continue beyond previous highs.

The evidence at hand weighs heavily in favor of the contention that the freezes of the past season forced a retirement in production that is temporary in the strictest sense. We must face up to the fact that the years ahead will see us sail past our previous production records and proceed on a course leading to successively larger citrus crops. Inevitably, this prospect brings to the forefront a question which was temporarily postponed, but by no means resolved, by the freezes of last year. This question is: "What are the economic conditions ultimately confronting the citrus industry in Florida as production continues to expand?"

In beginning an investigation of this question, it is appropriate to examine how far we will likely go in increasing the production of citrus fruits in Florida. Unfortunately, there are no means of estimating the exact volume of fruit which we will produce when the industry becomes fully developed. Actually, the volume of fruit that we may produce at such time is a moot question. It is an understanding of how and why economic forces will dictate the upper limits of our production efforts that is truly important to the citrus industry.

The inclination of growers in Florida to increase their output of citrus fruits in the future will depend both upon their costs of production and upon price expectations. Under the competitive circumstances prevailing in the production of citrus today, the interplay of these two economic forces will with certainty and with accuracy guide our production efforts of the future, and will eventually dictate the limits of our capacity to produce. Let us examine briefly how these two forces will work to this end.

Everyone in the business of producing citrus fruit in Florida has the profit motive. Everyone is interested in the maximum profit that can be obtained from his production activity. The maximization of profit in the production of cirtus is not achieved, as many suppose, by producing at the lowest possible cost. Instead, it is achieved by expanding production well beyond this point. In order to obtain maximum income, growers will continue to expand production as long as it is in any measure profitable. They will cease expanding only when additional production will not return them a profit. This characteristic of the long-run behavior of individuals, and consequently of the industry as a whole, is known as producing up to the point where marginal cost of production is equal to marginal revenue.

A thorough understanding of the idea that the production of citrus fruits in Florida will continue until cost of producing additional volumes is equal to the price that it will bring is essential to an understanding of the situation in which the industry will find itself when the upper limit of production is reached. Why is it that the lowest production cost per box does not return to the grower or the industry the maximum profit? The answer lies in the fact that, as long as citrus fruit can be produced at a cost less than the selling price, additional production will contribute to the income of the grower. True, the fruit produced by a grower at costs above the lowest at which he is capable of producing will return him a smaller margin of profit. But the grower and the industry are not

(Continued on page 14)

Presented at the 12th Indian River Citrus Seminar, Vero Beach, Florida, October 1, 1958.

You can't afford to take chances . . .

S·P·M "Yield Insurance" costs only pennies a tree

A few pounds of water-soluble magnesium, at just a few cents a tree, can make the difference between a bumper yield and no yield at all. That's the vital importance of magnesium to Florida citrus growers. And that's why you can't afford to take the chance of buying so-called "complete" fertilizers without Sul-Po-Mag* (double sulphate of potash-magnesia).

If you're thinking of saving a few cents by buying fertilizers without magnesium, you should carefully weigh the following facts.

(1) Nearly all Florida citrus soils traditionally lack adequate available magnesium and need regular special applications of this vital element.

(2) The average citrus tree removes 1 ½ to more than 3 pounds of magnesium from the soil per year. That's a lot of magnesium, when you consider the lack of magnesium reserve in Florida soils.

(3) Leaching also contributes to the need for replacement of all nutrients vital to the health and production of citrus trees. It is a continuous process of nature in all years.

To maintain minimum available magnesium, average Florida citrus soils require an annual application of 0.2 to 0.4 lbs. water soluble magnesium (magnesium oxide equivalent) per box of fruit . . . for example, 1.6 to 3.2 lbs. for an eight-box tree.

By checking the guaranteed analysis of the fertilizer you buy, you can quickly determine the application rate necessary to supply this magnesium.

How to Detect Shortage

The first visible evidence of magnesium deficiency shows up on leaves near the fruit. Irregular yellow blotches appear along the midrib of the leaf, while the leaf veins remain green. Such trees will soon lose foliage and young wood. They'll lose yield, size, and quality of fruit. But the big risk is that, by the time deficiency symptoms appear, you've already suffered severe profit losses — often for several years.

It's better not to take the chance. Magnesium is so quickly used up in Florida soils that the only safe way to assure steady top yields is to supply the recommended amount of magnesium annually.

SUL-PO-MAG* Advantages

S•P•M premium fertilizers, containing Sul-Po-Mag, are especially made for Florida citrus soils. Sul-Po-Mag is a combination of water-soluble, fast acting, readily available magnesium and sulphate of potash.

Sul-Po-Mag does not change soil pH. It can be mixed in the ratio you need to meet your individual requirements. It can also be used for direct application where only potash and magnesium fertilization is indicated.

Sul-Po-Mag is granular in form. It stays in the soil to feed trees longer... assures sustained fruit development over the entire season.

For positive insurance against losses due to magnesium deficiency, be sure your fertilizer contains Sul-Po-Mag. Most citrus fertilizer manufacturers make premium grade complete fertilizers containing it.

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Administrative Center: Skokie, Illinois

THE ECONOMIC LIMIT OF FLORIDA'S CAPACITY

(Continued from page 12)

concerned about the margin of profit the interest is in maximum profit. Even though the margin of profit tends to diminish as production is pushed higher and higher, the industry will continue to expand as long as the extra output makes any contribution to the net incomes of the grower. This is the only way that the maximum profit from the production of citrus fruit in Florida can be obtained in the long run. This means that the full development of the citrus industry in Florida will, of necessity, give rise to a situation where there will be some groves that will consistently fail to return their owners a profit.

Thus, when viewed from the production side of affairs, the economic principles under which we operate dictate that the ultimate size of citrus crops in Florida will be determined by price and production costs. Price, or price expectations, will set the limits upon the amount of money that growers will spend to bring new groves into production or to increase their output on existing acreage. The quality of fruit that we will produce in the aggregate within these limits will be determined by the nature of our production costs. If the per box cost of producing fruit rises rapidly as we expand production, then the citrus industry may quickly and sharpely be brought up against the limits set by price on our total capacity to produce. On the other hand, if technological innovations result in a general lowering of production costs within the industry, then our total capacity to produce will be redefined in terms of the new cost structure. Production may extend considerably beyond the volume of fruit that we would have been capable of producing under the original condition of higher production costs.

Clearly, price plays an important role in determining the volume of fruit which we will ultimately produce. For this reason, it becomes of utmost importance to maintain prices at the highest levels practicable in order that the industry and the economy of Florida can enjoy the maximum amount of income from citrus production. An understanding of what is involved in maintaining prices at levels that will permit the citrus industry to expand entails an examination of the demand side of the citrus picture.

It is a widly understood elementary economic principle which maintains that the market price of a product varies inversely with the amounts that are available. This principle holds for Florida citrus just as it does for the many hundreds of other products produced in this country. As the price of citrus fruit is increased, consumers will tend to respond by lowering their purchases. As the price falls, they will tend to respond by increasing their purchases. Viewed from a supply standpoint, the converse is equally true. As the quantity available becomes more plentiful, prices will tend to fall, and as supplies become progressively scarce, the price will rise.

The effect of a supply reduction under a comparatively stable demand situation was vividly illustrated during the past winter. When the cold weather reduced the available supply of citrus by about 19 million boxes, a rapid upward movement in prices occurred as an automatic adjustment to the revised supply situation. The demand for fruit did not change with the freeze of last winter. We simply moved to another position on the existing demand schedule that conformed to the prices which our reduced supply would command in the marketplace.

Given any conceivable demand relationship for our products, we cannot escape the fact that successively larger crops will result in lower and lower prices. Since the industry produces under conditions of increasing costs, it follows that, with a stable demand, rising costs of production will eventually meet the downward movement of prices. When this occurs we have reached the economic limit of our capacity to produce. The meeting of rising production costs and falling prices can be averted only by increasing the demand for our products.

Increasing the demand for Florida citrus involves the creation of an effective desire on the part of consumers that is of a higher order than previously existed. It is essential that a greater desire exist and that this desire be effective in the sense that consumers in the aggregate stand ready to pay more for any given quantity than under the original demand situation. Effecting increases in the demand is the only way that we can continue to expand the citrus industry in Florida.

Several alternative approches may be taken to the problem of increasing the demand for Florida citrus. With varying intensity all of these should and will be pursued in the years ahead.

One way of increasing the demand is to induce more people to consume Florida citrus products. Recent national studies reveal that among the existing population there is little that can be accomplished in this direction. Citrus in some form is already used by practically every household in the United States.[1] However, we have an ever-growing national population, and it is essential that we bend every effort to get our products into the millions of newly-formed households of the future. Over the past 12 years the population has been increasing at an average annual rate of 2.6 million persons. If we are successful in inducing this added population to consume Florida citrus at a rate just equal to that of all people in the country during recent years, then this new market alone will absorb about 1-½ million boxes of Florida oranges and about ½ million boxes of grapefruit.

A great potential for increasing the number of people who consume our products also lies in the development of foreign markets. While currency restrictions and low living standards preclude the possibility of entering markets in many areas of the world, we should be ever watchful for changes in world economic conditions that may signal an opportunity for expansion of our market abroad. It is gratifying to see the interest on the part of individual firms and industry organizations in the export market for our products. It is highly desirable that efforts to establish a substantial export market for Florida citrus be continued and intensified. Aside from the population growth that we experience internally, this is the only way that we can bring substantial numbers of new people into the market. Generally speaking, broadening the consumer base is one of the more effective means of accomplishing an increase in the demand.

A second major means of increasing demand consists of inducing existing consumers to increase the rate at which they use our products. At first glance, the rapid growth of citrus production in Florida during recent years would suggest that we have been rather successful in

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[1] U. S. Department of Agriculture, Agricultural Marketing Service Report No. 243, Homemakers Appraise Citrus Products, Avocados, Dates, and Raisins, Washington, D. C., June 1958.

CITRUS INSECT CONTROL FOR SUMMER 1959 . . .

(Continued from page 3)

available.

Parathion at .25 pound of active ingredient per 100 gallons is effective. If there is a light infestation of scale, .15 pound is sufficient. If parathion is used, follow precautions on the label. Parathion does not affect solids or color and can be applied any time during the summer. It is especially recommended where color is important as on tangerines, early varieties of oranges and early grapefruit. Parathion does not control purple mite and greasy spot. A mixture of .15 pound of actual parathion plus 0.5 percent to 0.7 percent oil is a very effective scalicide, will not affect color as much as 1.3 percent oil and will aid in greasy spot and purple mite control. However, the mixture of oil and parathion may also cause leaf-drop in dry weather.

Malathion at 0.75 pound to 1.25 pound active ingredient per 100 gallons is also recommended. Use the dilute dosage for light infestations and the maximum dosage for heavy infestations. Malathion is more expensive than parathion, but much safer to use. A mixture of 0.5 pound of actual malathion plus 0.5 percent oil for light infestations and 0.7 percent oil for heavier infestations may also be used. For heavy infestations, use 0.75 pound of actual malathion plus 0.7 percent oil. There has been less leaf-drop with malathion and oil than with parathion and oil.

Rust Mite Control: The summer spray is the most important of all applications in the control of citrus rust mite. This is true because this mite is more numerous, more difficult to control and therefore more injurious during June, July and early August than at any other time of the year. The most effective control program should therefore be used during the summer months. Such a program includes the following: (1) rust mite populations should be kept at low levels prior to application of the summer scalicide spray; (2) the most effective available rust mite miticide should be used in the summer, and (3) the spray should be applied thoroughly. If this program is followed completely, excellent summer control of rust mite will be obtained and control will be easy during the following fall and winter. If any part of this program is neglected, however, rust mite control may well be a disappointment.

Rust mite very often multiplies rapidly to high populations before the summer spray can be applied. This rarely occurs where zineb was used in the post-bloom spray and then it is usually confined to foliage and occasional fruit, but it frequently occurs where sulfur was used in the post-bloom spray. If a serious build-up does occur before the summer spray can be applied, rust mite should be controlled with an extra application to prevent russet and to increase the effectiveness of the summer spray. Sulfur dust is economical and effective for a short interval, but zineb, Chlorobenzilate, and sulfur sprays, listed in decreasing order of effectiveness, are preferable for this purpose.

The most effective available rust mite miticide is zineb. In terms of control, it is also the cheapest. Chlorobenzilate, although less effective than zineb, is superior to sulfur. Zineb and Cholorobenzilate may be used with parathion, malathion, or oil emulsion, but sulfur cannot be used with oil.

Zineb should be used at 0.5 pound per 100 gallons of spray. The higher dosage of 1.0 pound will produce a slight, but generally insignificant increase in the interval of control. The higher dosage is not necessary unless zineb is used for greasy spot as well as rust mite or unless the fall application for spider mite and rust mite is to be omitted.

The effectiveness of zineb is not enhanced by parathion, but is somewhat increased by oil. On the other hand, the effectiveness of zineb is greatly decreased by all copper compounds. Zineb should not be used in the summer spray if copper in any form is to be included. However, there is one exception to this. The addition of oil emulsion to zineb-copper sprays overcomes the ill effect of copper on rust mite control with zineb. Mixtures of copper, zineb, and oil should, therefore be satisfactory, but zineb should not be used with copper in any other combination.

The addition of sulfur to zineb sprays increases the speed of initial clean-up and may also be of value where complete coverage is impossible. The length of control with zineb is not affected by sulfur.

Both Chlorobenzilate and zineb have a further advantage over sulfur. In summer sprays, neither has shown any

tendency to increase purple mite. In fact, purple mite should rarely be a problem before fall where either is used in the summer. Sulfur, however, may cause a quick post-application increase in purple mite, but will delay the build-up of Texas citrus mite.

Mealybug Control: Where mealybugs are a problem, spray with either parathion or malathion at the dosage used for scale.

Greasy Spot Control: Summer treatment for greasy spot control will depend upon the post-bloom treatment. If a post-bloom copper was applied, a summer oil plus zineb for rust mite control, should result in good greasy spot control. If parathion or malathion is used as the summer scalicide, add about 0.3 pounds of metallic copper in the form of neutral copper, per 100 gallons. Large amounts of copper sometimes cause corky lesions like melanose and wind scar to become raised and dark in color, but low amounts of copper have not had that effect. If no copper was used in the post-bloom spray, the amount of copper should be increased to 0.5 pound metallic, but this amount of copper may cause star melanose and should not be used on oranges grown for the fresh fruit market. The addition of 0.3 pound of copper to the oil will also be more effective than oil alone and is recommended where copper was not applied post-bloom. (See "Rust Mite Control" for copper-zineb mixture.)

The best time of application for greasy spot control has not been determined, but the spray should be applied within four to six weeks after the last flush of growth.

Red Spider Control: Purple mite is very likely to be a problem during late summer if sulfur instead of zineb or Chlorobenzilate is used in a summer parathion spray. In this event, control may be obtained with 1.0 pound of Trithion wettable powder, 0.5 pint of Trithion liquid concentrate, or 1.5 pint of Kelthane per 100 gallons of spray. Trithion may cause injury on grapefruit, but no injury has been observed on oranges.

Texas citrus mite is more easily controlled than purple mite and may be controlled with the same materials.

Whitefly Control: There is a considerable amount of sooty mold on the leaves this year and many questions about its removal have been asked. Oil will help to remove sooty mold, but it is more important to control the whitefly to prevent additional sooty mold. Whitefly larvae excrete honeydew and sooty mold grows on the honeydew. It is therefore necessary to kill the whitefly to keep leaves free of this fungus. The insecticides that control scale will also control whitefly, but timing of the spray and coverage of the under surface of leaves are the most important factors in whitefly control. Where whitefly is a problem, apply the spray after the summer brood of adults has deposited eggs. The summer brood of adults usually emerges in June, so the scalicide should not be applied until July.

Details on spray schedules and pesticides will be found in the "Better Fruit Program" which also contains information on selecting, mixing, and handling spray materials. For further information consult the Citrus Experiment Station at Lake Alfred or Fort Pierce.

Citrus Nursery Sites Approved

By W. G. COWPERTHWAITE, COMMISSIONER, STATE PLANT BOARD

Although citrus nursery site approval could be considered a little known program, it nevertheless is an entirely important one. And, although it deals specifically with nurseries, the citrus grower is the individual who can call the turn of the degree of program success.

The object of citrus nursery site approval is to prevent the movement of spreading decline and the burrowing nematode into commercial citrus. Long considered a prime source of the infestation, citrus nurseries nonetheless can remain nematode-free by strict adherence to site approval requirements.

The easiest way to insure a clean nursery is to remove the planting sites from all possible contact with the nematode causing the disease. That means establishing barriers of uninfested acreage between the sites and such menaces as diseased citrus groves and other infested trees and plants.

That, in brief, is the reasoning behind the site approval plan.

How well this plan succeeds will depend upon the fullest cooperation of both the nurseryman and the citrus grower. The heaviest influence can be wielded by the grower in demanding that citrus nursery stock purchased be certified free of the burrowing nematode. This certification is made by the State Plant Board only after careful inspection or survey. To date, 1,168 nurseries are entitled to use of this certificate, although some may lose this privilege due to the continuing advance of spreading decline in the vicinity of the nursery.

State Plant Board inspectors have approved 719 sites thus far for the the production of citrus nursery stock. The variance between this figure and the number of nurseries employing burrowing nematode certificates indicates the number of new plantings made since February, 1958. Prior to that date, plantings were approved and certificates issued on the basis of root sample examination when no burrowing nematode infestations were found within 50 feet distance.

To accomplish the proposed clean-up of all citrus nurseries, certain rules and regulations have been instituted as guides for future plantings. These rules apply both to established nurseries planning to replant and to new sites which are being set out or will be set out shortly. The proximity of the burrowing nematode to any nursery site will determine approval. This point may seem unimportant to the nurseryman, but it is or should be of utmost significance to the grower who might purchase the stock.

Established nurseries can be prohibited from replanting to citrus under some circumstances. This could result from the discovery of the burrowing nematode within the nursery or in nearby dooryard and citrus plantings. Fumigation and a fallow-period treatment are necessary for approval, with the site locations dependent upon distances from the known infestations.

Anyone intending to plant a new area to citrus nursery stock should have the site checked thoroughly. Generally, only virgin land or land where certain domesticated perennials have never grown are acceptable as sites. If there is any reason to suspect the area, then root samples must be collected for verification. In the event the nematode is found, then fumigation and a fallow-period treatment are required.

Among things to consider in site selection is that the land be at least 100 feet from very small shrubs and 200 feet or more from dooryard or established domesticated perennial plants when such plants have been sampled and found negative. If the sampling of these plants is positive, then the minimum distance will be increased to 400 feet.

No minimum distance is required from certain trees immune to the

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FINDING THE BEST LEMON FOR FLORIDA ... A REPORT OF PROGRESS

(Continued from page 10)

were analyzed 30 minutes later in a Bechman Model B spectrophotometer at various wave lengths using a 10 mm. cell.

Certain samples of the crude bioflavonoid complex were analyzed in the ultraviolet region. This was accomplished by dissolving 100 mg. of the dried product in 25 ml. of dimethylformamide to which one drop of glacial acetic acid has been added. After one hour, one ml. was diluted to 25 ml. with more dimethylformamide, and the solution analyzed in a Bechman DU Quartz spectrophotometer using a 10 mm. cell.

The concentrated lemon extracts stored at 40° F. were chromatographed in a preliminary fashion with the aid of a p-nitro-aniline diazo as a chromogenic spray.

Results and Discussion of Results

The extraction data accumulated from the alkaline extraction of the 42 comminuted lemon peel samples are shown in Table 6. The lemon selections have been listed in accordance with hesperidin yield obtained. It will be noted that there is no correlation between hesperidin yield from a lemon selection and the grams of calcium hydroxide or volume of hydrochloric acid used. The selections yielding the highest quantity of crude hesperidin or bioflavonoid extract often had the lowest per cent of actual hesperidin, by virtue of a higher quantity of ballast impurities. The variance of the per cent hesperidin in the crude hesperidin is also shown. In this same table are the degree of Brix (acid corrected refractometer reading) and per cent acid of the lemon juice for each lemon selection. No correlation or trends exists between these figures and hesperidin yield.

Although the 42 lemon selections have been arranged according to yield of hesperidin which was determined by the non-specific Davis test, it should be understood that hesperidin yield from oranges is related to maturity (2). Thus it is quite possible that if the samples were picked in a different order, or at a different degree of mautrity, that the order of arrangement of selections would be different. It was further noted that the best yields of hesperidin from the lemons were no better than those obtained from oranges. This, of course, could be due to the maturity of the samples. If the hesperidin of lemons is the only bioflavonoid present of commercial importance, then lemons would not appear to have a competitive advantage over oranges.

When the concentrated neutralized bioflavonoid filtrate samples stored at 40° F. were chromatographed, it was found that they all were very similar except for Selections 25 and A. These selections did not show a typical hesperidin spot when sprayed with a nitro-aniline diazo. It was expected that there might be sharp differences among the 42 samples; but this was not the case.

In an attempt to find other significant differences between the lemon selections, certain samples of the isolated crude hesperidin were dissolved at various concentrations in dimethylformamide, colormetrically developed by Davis test and analyzed in a Beckman, Model B spectrophotometer using 10 mm. cells. Figure 4 graphically shows differences between samples that are more than just concentration differences. From this figure it can be seen that Selection Nos. 1, 37, A, 26, 18, and 19 closely resemble one another and appear to differ markedly only in concentration. Selection Nos. 25, 30, and 28 were different in appearance by more than just concentration level. Selection 25, which is most unlike the others, was found to contain a very low concentration of hesperidin.

In another attempt to find significant difference between lemon selections, some of the crude hesperidin samples were dissolved in dimethyl formamide and compared in the ultraviolet region using the DU Quartz spectrophotometer and 10 mm. cells. These results are shown in Figure 5. It will be noted that each selection had typical maximum absorption peaks at 285 mu. as does hesperidin and closely resembled each other except for concentration level.

Discussion

The physical and chemical properties of samples of coldpressed lemon oil prepared from 42 lemon selections have been determined. It was shown that the December freeze had no detrimental effect on the quality of the oil.

Quality of the oils, as indicated by their physical and chemical characteristics is dependent upon the yield of oil obtained. It is also determined by the quantity of aqueous phase that comes in contact with the oil during processing, since the aldehyde content of the oil is affected by this factor. It was also shown that as the yield of oil per ton of fruit increased,

the aldehyde content of the oil increased.

While this study is on the basis of only one year's work, it definitely shows that certain of the lemon selections give oils which meet the specifications of the United States Pharmacopoeia and other high-quality requirements. If the proper lemon is selected and the oil manufactured carefully, Florida can produce a lemon oil superior to any now produced in the United States.

An investigation was made to determine the bioflavonoid content of 42 lemon selections. Chromatographic and ultraviolet evaluation of the bio-flavonoids showed them to be predominantly hesperidin. If hesperidin is the only bioflavonoid of commercial importance, lemons would not appear to have a competitive advantage over oranges since yields are comparable.

Literature Cited

1. Davis, W. B. Determination of flavonones in citrus fruits. Anal. Chem. 19: 476-478. 1947.

2. Hendrickson, R. and J. W. Kesterson. Hesperidin the principal glucoside of oranges. Florida Agr. Exp. Sta. Bul. 545: 1-43. 1954.

3. Hood, S. C. Relative oil yield of Florida oranges. Ind. Eng. Chem. 8: 709-711. 1916.

4. Kesterson, J. W. and R. Hendrickson. Essential oils from Florida citrus. Florida Agr. Exp. Sta. Bul. 521: 5-70, 1953.

5. Merck Index of Chemicals and Drugs. 6th Ed. Merck & Co, Inc. Rahway. 1167 pp. 1952.

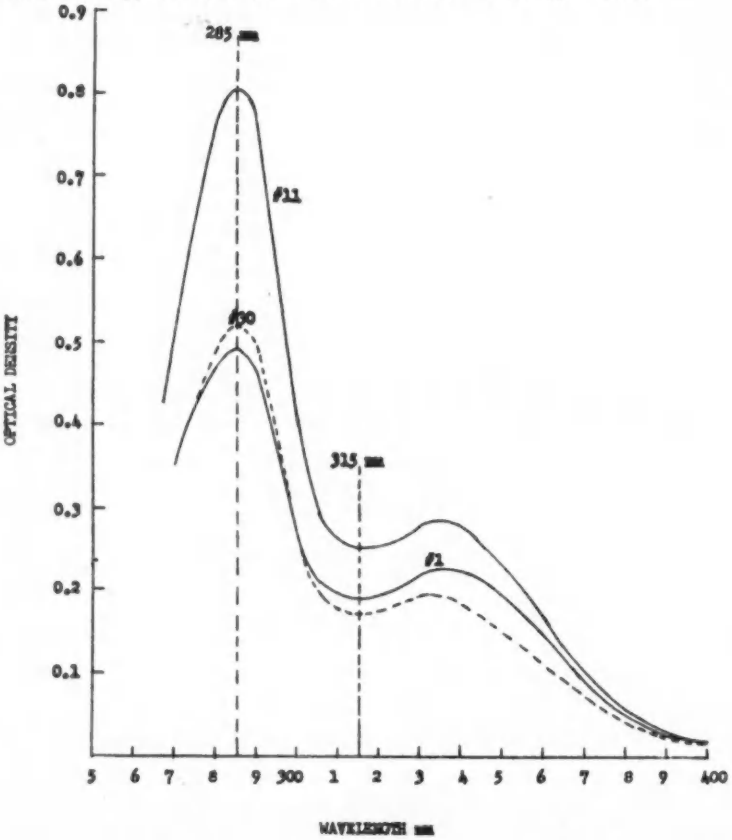

Fig. 5. Comparison of three lemon bioflavonoid extracts in the ultra-violet region using a DU Quartz spectrophotometer, 10 mm. cell and dissolving samples in dimethylformamide as a 0.016 per cent of solution.

PESTICIDE PRECAUTIONS

When working with chemicals for the control of garden pests, sonsider all pesticides to be potential poisons, warns Bruce A. Barmby, interim assistant vegetable crops specialist with the Florida Agricultural Extension Service.

Apply each pesticide according to manufacturer's precautions and recommendations. Always wash vegetables thoroughly before using. Pse pesticides only as necessary to control insects and diseases. Where possible, stop applications during the harvesting season.

THE ECONOMIC LIMIT OF FLORIDA'S CAPACITY

(Continued from page 14)

increasing consumption rates. However, an examination of the national supply of citrus in relation to the population reveals that the production gains in Florida have been largely offset by the gradual retirement of production in California, and by the virtual disappearance of Texas as a producing area as a result of freezes in 1949 and 1950. The per capita production of all citrus has been rather stable at a level of 85 to 90 pounds since 1950. This is actually somewhat below the per capita production level of the years prior to the Texas freezes. While we have substantially improved our position with regard to our share of the national market, we have yet to face fully the problem of inducing people to consume citrus products at a higher rate.

It is doubtful that we can escape this issue permanently. Even if Texas production stabilizes at a level far below the 28 million boxes produced in 1948, and even if there is a continuing withdrawal of California from the national markets, it seems certain that our capacity and inclination to produce will bring the problem of increasing per capita consumption rates to the forefront in the years ahead.

The problem of expanding demand by increasing consumption rates can be approached from two directions. Through promotional activities, such as that currently being carried on by our Citrus Commission and by many private marketing firms, an effort can be made to induce consumers to increase the rate at which they consume citrus in the several forms that are now marketed. The second approach to the problem consists of research and development of new products that will broaden the use base. This, also, is being pursued with diligence by private, state, and Federal research agencies. Because both of these alternatives hold promise, and since we cannot in any event take the risk of making the wrong choice between them, the industry must continue and in fact, intensify its efforts in both areas in its quest for an increasing demand for Florida citrus.

There is little question but what the citrus industry of Florida can, through the pursuit of the methods previously mentioned, effect an upward shift in the demand for its products. The real question to which the industry should be giving much hard thought is how far to

go in this direction. The creation of a higher order of desire for our products will be a difficult and expensive process. Moreover, it is one that will be progressively more difficult and costly as we need to move to higher and higher levels.

It is important to remember that the national economy operates quite automatically and in a most delicate fashion. The aggregate sum of money that we all earn is matched precisely by what we spend and what we save. It is inescapable that, as we increase the demand for citrus in the domestic market, we do so at the expense of some other component of the expenditure pattern. In other words, we convince the consumer to forego the consumption of some other item to consume Florida citrus. We seek to rearrange the consumer expenditure pattern to our advantage. This can be done, and it must be done, if we are to accomplish an increase in the demand for our products. However, it is not easy under any conditions, and it becomes progressively harder as the share involved grows larger.

Viewed from the long-run, there are many possible junctures at which the citrus industry of Florida might reach maturity as a result of the gradual convergence of production costs and the price of fruit. Shifting the demand upward merely redefines the point at which this takes place and, in so doing, redefines the economic limits of our productive capacity. Expenditures on research and promotional efforts designed to increase the demand for citrus, is, in effect, a method of purchasing the right to produce more fruit than the price limits set by the original demand relationship would permit. Since the higher price associated with an increase in demand applies to the entire volume of production, there is every reason for us to intensify our efforts in the direction of accomplishing an increase in the demand for our products. The pressing question of the immediate future is not whether we should invest resources in activities designed to increase the demand for citrus, but how to maximize the effectiveness of our investment to this end. While outside the scope of this discussion, this, in itself, is a matter that should receive an increasing amount of attention.

Looking beyond the immediate future, however, we need to recognize that, regardless of the intelligence and the ingenuity with which we engage in demand stimulating activity, a time will come when the investment and effort involved will not yield a net return to the industry. It is unfortunate that this will not occur with a suddenness and a clarity that all can see. Actually, it will occur with deceptive gradualness, and will, with the fullest understanding of the economic principles involved, be difficult to recognize. This is why it is important that the industry engage in long-range thinking during these comparatively prosperous times. It is only through an undestanding of the economic principles involved that we can make an orderly approach to the limits of our productive capacity. Through such understanding we can avoid the traumatic experiences of irrational overexpansion, and the accompanying throes of readjustment, depressed prices, and capital losses that will be painful and costly to all. Growers have no reason to view with alarm the prospects that we will ultimately reach a limit in our capacity to produce. This is, after all, the only point at which growers individually and collectively can enjoy the maximum returns from the industry, and the only point at which our single largest agricultural industry will make its greatest contribution to the economy of Florida.

BURGUNDY . . . A NEW VARIETY OF GRAPEFRUIT

(Continued from page 5)

meeting legal maturity standards during this period. In actual commercial practice, the Burgundy grapefruit is generally harvested in May of each season.

Of the physical factors Burgundy grapefruit seemed to be practically seedless, since on the average only one seed was found in eight fruit. The fruit contained a thin rind, 13 sections, and an open core which averaged .60 inches in diameter and appeared larger than in other pink and red varieties. The shape was similar to other grapefruit.

The Burgundy grapefruit appears to be satisfactory for processing as citrus salad. Sections of this fruit prepared commercially as chilled and frozen products retained their deep red color. The color of sections processed by heating in glass jars appeared unchanged after four months at room temperature. The juice is much deeper red than that of Ruby Red.

In summary, the Burgundy is a distinct variety of grapefruit possessing a deep red color of the flesh without any red blush in the rind. In early November, this grapefruit grown on sour orange or rough lemon rootstock failed to meet all of the maturity standards. It is also practically seedless, and suitable for citrus salad, either as chilled, frozen, or heat-processed.

ACKNOWLEDGEMENT

The authors are indebted to Mr. Gray Singleton, Salada-Shirriff-Horsey, Ltd., for preparing and processing sections for citrus salad.

Table I.

The internal quality and physical characteristics of Burgundy grapefruit grown on two rootstocks and harvested on November 5, 1958(1).

Fruit Factors	Rootstocks	
	Sour Orange	Rough Lemon
Soluble Solids (%)	8.6	7.3
Acid (%)	1.38	1.05
Ratio Solids/Acid	6.3	7.0
Juice (%)	39	41
Juice cc/fruit	119	132
Vitamin C mg/100 cc	41	43
Ratio Diameter/height	1.16	1.14
Sections/fruit	13	13
Rind Thickness (in.)	.22	.21
Diameter of Core (in.)	.60	.60
Seeds/12 fruit	2	1

(1)Fruit size — 126.

The standard packed box of citrus contains one and three-fifths bushels, or a weight of 90 pounds for oranges, Temples and tangelos; 85 pounds for grapefruit; and 95 pounds for tangerines.

The U. S. Laboratory and Utilization Research At Winter Haven

Remarks by Dr. George W. Irving, Jr., Deputy Administrator, Agricultural Research Service, U. S. Department of Agriculture, at the luncheon preceding dedication of the U. S. Fruit and Vegetable Products Laboratory, Winter Haven, Fla., December 4, 1958.

It is a great pleasure to join with good friends here today for the dedication of a splended new facility for agricultural research. This occasion marks the newest milestone in a research trail that began here in 1931, when the citizens of Winter Haven raised funds for the building that was the Department's first Citrus Products Station, located on property donated by the City. We in the Department of Agriculture are most pleased with the close and effective working relationships that have developed here in Florida since that time between our Station, the State, and the industry. We feel we have been fortunate that so many of you recognized, so early, the need for vigorous research to develop new and improved processed products from the crops grown by your farmers—and, consequently, the need for modern facilities in which to conduct this research.

The partenership of industry, State, and Federal research in Florida has made major contributions to citrus processing in this State and elsewhere throughout the Nation. The critical study of deaeration, made in the old laboratory, was vital to the early canning industry. There also, research in cooperation with the Florida Citrus Commission, resulted in frozen citrus concentrate. More recently, we have studied the effect of time and temperature of storage and transit on quality of concentrate.

Super-concentrate and citrus powders have made their appearance based in part on research done at Department laboratories in Pasadena and Alabama, California. These western laboratories, and another at Weslaco, in the Rio Grande Valley of Texas, enable us to study citrus utilization in all of the major producing areas. As you know, the problems of the several areas have facets in common, but each has aspects also that are peculiar to one area. The sum of them all constitutes the National problem.

The magnificent new laboratory we dedicate today is in every way a worthy successor to those that have gone before. Its impressive appearance, in its handsome and appropriate setting, does credit to us all. But of more profound import is the fact that this building will make it possible to provide equipment and facilities for the type of work to be done that will be unsurpassed anywhere. With these facilities, the capable professional staff we now have, and those that can be added to it, will have the tools that are essential for the kind of research needed in solving today's problems of fruit and vegetable utilization.

Chemical science has made great strides in recent times. Technology has advanced so that we may hope to isolate and identify the individual members of fantastically complex mixtures. The unraveling of the chemistry of flavors and off-flavors, as well as the chemistry of nutrients and other factors, is no longer beyond reach. Many of the methods and devices that will contribute to this unknown and some undreamed of when I was in college. Others were thought to be impossible. We will apply all of these new techniques and devices in our new laboratory, and we expect to contribute also too the discovery of still newer techniques and devices for scientific investigation in the basic research program the laboratory will soon have under way.

This new Winter Haven laboratory thus becomes an important part of the vigorous, Nationwide program of utilization research being conducted by the Department. Utilzation research means the search for new processes that will extend the farmer's market and reduce marketing costs. It means a search for entirely new economic products that will open up outlets for farm products unknown today.

Among the fruits, vegetables, dairy products, and other commodities clearly unsuited for industrial use, we seek new and improved foods, excellent in quality and more convenient to prepare for the table. Experience has long since demonstrated the effect that such products can have on an industry. Potato granules and flakes, with which our laboratories have worked for some time, along with a number of other processed products, are beginning to benefit the potato industry, just as frozen concentrate has aided the citrus industry. We are working intensively today to develop thoroughly satisfactory dry, whole milk. We believe it can be done and that it will expand the dairyman's market significantly. Since it requires several pounds of feed to produce a pound of meat or milk, it is clear that continued increase in consumption of these excellent foods will contribute to proportionately larger reductions in some of our farm surpluses.

But we are producing today more of a number of commodities than we can expect to eat or wear over a period of many years. I'm sure we all agree that the outlook would be bleak indeed if the oposite were true. But currently, the accumulation of these commodities constitutes a serious problem. To make effective and economic use of these farm products, we seek to develop, from the starches, sugars, fats, and proteins they contain, industrial materials and chemicals having properties that are not obtainable from other raw materials at lesser cost. Most, if not all, of the many products of today's gargantuan chemical industry could be made from agricultural raw materials. But it would not pay, in most cases, because petroleum and coal, though irreplaceable resources, are generally less costly and more constant in price and quality. Well-supported industrial research, as a matter of fact, is driving the farmer from many of his traditional markets in industry. Synthetic detergents have displaced two thirds of our soap, crowding out of the market the fats from which soap is made. Plastics are replacing leather in over half our shoes. Man-made fibers are making substantial inroads on cotton and wool.

Nevertheless, the constituents of agricultural commodities have properties and chemical structures not possessed by other raw materials, and advantage can be taken of them through research to open new and large markets now wholly unknown. Programs in this field have already proved fruitful. Our Northern Utilization Research and Develop-

Hybrid Type Citrus In Florida

. . . By . . .

ZACH SAVAGE
AGRICULTURIST ECONOMIST
AGRICULTURIAL
EXPERIMENT STATIONS

There were 20 orange trees to each Temple tree in 1956 and five grapefruit trees to each Temple. The 1,592,071 Temple trees reported by the State Plant Board, Gainesville, were in 35 counties but 65 percent were in Lake, Orange, Polk and Saint Lucie. Twenty-four percent of these trees were in Lake County. See accompanying table. Eighty-seven percent were in the top 10 counties. Martin County had 19 percent more Temple trees than grapefruit trees. This was the only county with more Temple than grapefruit trees. There were more Temple trees than early orange varieties in Dade, Indian River, Lee, Martin, Palm Beach and Saint Lucie counties. There were more Temple than midseason orange varieties in Broward, Martin and Palm Beach. There were more Temple trees than tangerine in 19 counties; Lake, Orange, Saint Lucie, Indian River, Brevard, Highlands, Hillsborough, Pasco, Pinellas, Osceola, Broward, Charlotte, Citrus, Lee, Manatee, Martin, Okeechobee, Palm Beach, and Sarasota.

Three varieties of tangelos were second in importance in the hybrid group. These varieties were Orlando, Minneola and Thornton. The Orlando variety made up 79 percent of the trees of the three varieties. The Minneola was second in importance with 16 percent of these trees and Thornton 5 percent.

There were 34,474 trees classified as other hybrids. Seventy-one percent of these were in the four counties of Lake, Manatee, Saint Lucie, and Broward.

All hybrid types amounted to 1,951,728 trees. This was 4.3 percent of all citrus trees in Florida. Temple made up 81 percent of the hybrid group, tangelos 17 percent and other hybrids 2 percent. Seminole was the only county in which there were more tangelo trees than Temple.

There were 64 percent of all hybrid type trees in the top four counties of Lake, Orange, Polk and Saint Lucie. An additional 22 percent were in Hillsborough, Pasco, Highlands, Indian River, Brevard and Seminole, making 86 percent of these trees in these top 10 counties. The remaining 277,856 trees, 14 percent, were in 25 other counties ranging from 47,424 trees in Osceola to 59 in Alachua.

County	All Hybrid Types			Temples			Orlando			Tangelo			Other Tangelos** And Hybrids		
	Trees	Percent	Rank	Trees	Percent	Rank	Trees	Percent	Rank	Trees	Percent	Rank	Trees	Percent	Rank
Lake	503,427	25.8	1	384,169	24.1	1	88,793	34.8	1	30,465	29.2	1			
Orange	346,388	17.7	2	280,615	17.6	2	57,930	22.7	2	7,843	7.5	4			
Polk	218,891	11.2	3	193,972	12.2	4	19,113	7.5	4	5,806	5.6	6			
St. Lucie	189,036	9.7	4	177,456	11.1	4	3,794	1.5	10	7,786	7.5	5			
Hillsborough	87,658	4.5	5	79,825	5.0	5	6,366	2.5	6	1,467	1.4	14			
Pasco	73,729	3.8	6	65,844	4.1	6	4,936	1.9	8	2,949	2.8	10			
Highlands	72,488	3.7	7	64,327	4.0	7	6,362	2.5	7	1,799	1.7	13			
Indian River	62,783	3.2	8	56,502	3.6	8	2,137	.8	16	4,144	4.0	8			
Brevard	60,438	3.1	9	45,884	2.9	9	2,222	.9	15	12,332	11.8	2			
Seminole	59,034	3.0	10	29,349	1.8	12	27,775	10.9	3	1,910	1.8	12			
Osceola	47,424	2.4	11	45,022	2.8	10	2,402	.9	13	—	—	—			
Manatee	45,943	2.3	12	21,665	1.4	13	12,541	4.9	5	11,737	11.3	3			
Pinellas	41,298	2.1	13	36,526	2.3	11	1,127	.4	19	3,645	3.5	9			
Hardee	19,568	1.0	14	14,804	.9	14	4,440	1.7	9	324	.3	22			
Marion	17,995	.9	15	14,050	.9	15	3,447	1.4	11	498	.3	20			
Volusia	16,456	.8	16	13,316	.8	16	1,855	.7	17	1,285	1.2	15			
Palm Beach	14,202	.7	17	12,473	.8	17	825	.3	21	904	.9	16			
Martin	13,175	.7	18	12,069	.8	18	500	.2	22	606	.6	18			
De Soto	9,242	.5	19	5,246	.3	23	3,396	1.4	12	600	.6	19			
Broward	8,929	.5	20	4,476	.3	24	77	*	24	4,376	4.2	7			
Dade	8,179	.4	21	5,972	.4	20	40	*	26	2,167	2.1	11			
Charlotte	6,975	.4	22	6,975	.4	19	—	—	—	—	—	—			
Lee	5,890	.3	23	5,430	.3	22	105	.1	23	355	.3	21			
Citrus	5,621	.3	24	3,212	.2	25	2,355	.9	14	54	.1	24			
Hernando	5,556	.3	25	5,556	.4	21	—	—	—	—	—	—			
Sarasota	5,227	.3	26	2,639	.2	26	1,806	.7	18	782	.8	17			
Putnam	2,394	.1	27	2,340	.2	27	20	*	27	34	*	26			
Hendry	1,147	.1	28	147	*	30	1,000	.4	20	—	—	—			
Okeechobee	1,053	.1	29	801	.1	29	—	—	—	252	.2	23			
Sumpter	1,025	.1	30	990	.1	28	4	*	—	31	*	27			
St. Johns	183	*	31	61	*	34	72	*	25	50	.1	25			
Collier	135	*	32	119	*	31	16	*	28	—	—	—			
Duval	106	*	33	106	*	32	—	—	—	—	—	—			
Flagler	74	*	34	74	*	33	—	—	—	—	—	—			
Alachua	59	*	35	59	*	35	—	—	—	—	—	—			
Total	1,951,728	100.0		1,592,071	100.0		255,456	100.0		104,201	100.0				

* Less than 0.05 percent

** Minneola and Thornton varieties

VEGETABLE GROWERS WILL SEE RESEARCH AT 2 STATION UNITS

Vegetable field days at the Gulf Coast Experiment Station, Bradenton, May 13 and at the South Florida Field Laboratory, Immokalee, May 20, have been announced by Agricultural Experiment Station officials. Both will get under way at 10 a. m.

Dr. E. L. Spencer, soils chemist in charge, says the Gulf Coast Station staff will report on vegetable research during the past year. They will emphasize recommendations for fungicides, insecticides, herbicides, nematocidies, fertilizers and varieties. They will also report on plant breeding.

Visitors will see insecticide tests on tomatoes and cucumbers and promising new selections of tomatoes and pole beans during a tour of the Manatee farm the morning of May 13.

Following a box lunch they will tour the Cortez farm in the afternoon. Here they will see fertility and ulant nutrition studies; fungicide tests for cucumber foliage diseases and belly rot; soil fumigation studies with okra for nematode and weed control; weed control on pole beans and tomatoes with chemical herbicides; variety and observational tests with tomatoes, cantaloupes and sweet corn; and irrigation and water table studies with tomatoes, cucumbers and sweet corn.

Growers of the area are invited to see the tests and hear reports of results.

The LYONIZER

COMPILED BY THE LYONS FERTILIZER COMPANY

Reports Of Our Field Men . . .

NORTH CENTRAL FLORIDA

V. E. Bourland
Winter Garden, Fla.
Phone 107

We are about to have winter weather, windy and cool, but with the good moisture and a little sunshine we will soon forget it. Looks now that we will have about 60 percent of early and mid-season crops. Valencias about normal. I think all grapefruit will be short.

Melanose is the worse than it has been in years. Growers are very busy with their spraying machines. Most all insects are on hand, too.

Young trees are doing nicely, have made a wonderful growth. Melon growers are still having their troubles. Pastures are getting green, and cattle are looking good. Fruit is moving very slow.

SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

C. R. Wingfield
Phone: Glandale 2-8181
Avon Park, Fla.

During April growers have been busy with the post bloom spray program. At times the winds have been bad but think we will finally get the job finished. Melanose has been the worse we have had for a long time. It is noticed where a dormant copper was applied it is not as bad.

We are still looking for some early and mid-season fruit but fiud it is not there. With the heavy growth it is possiblly, to some degree, covered but it looks like a very light crop. Valencias appear to be holding a good crop but will not off-set the early crop shortage. There are some hopes for a May or June bloom which will help but it is very problematical. Duncan grapefruit most certainly will be very short. There are some bulk deals being made on the 1959-60 crop at prices slightly higher than this season.

The summer fertilizer application is here and much study should be given the proper balanced mixture, taking into consideration the wet spring and the soil reaction at this time. The heavy growth will demand more plant food where a crop is set and certainly ample poundage must be applied to support the new growth.

HILLSBOROUGH PASCO AND SUMTER COUNTIES

C. W. Dean
Gibsonton, Fla.
Phone Tampa 40-2592

It seems that the weather is finally settling down to a normal pace now. It has been such that the growers didn't know what to do. The vegetable growers have had it hard. The vegetables were hit very hard by the recent rains. That which has been salvaged doesn't look so good. They are either stunted in growth or diseased. It is hard to determine the outcome.

Citrus is looking good, however, I think we should fertilize sooner this next application, with a heavier application than normally would be applied. Some groves are beginning to show signs of hunger.

Spraying is in full swing now with most everyone applying a nutritional. With all the recent rains we have had, Melanose has been bad. Grapefruit trees have lost much of their foliage due to this.

SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

Eaves Allison
P. O. Box 365, Sarasota, Fla.
Phone Fulton 8-2611

For the first half of this month rust mites, scale, spider mites and melanose took a back seat, while the growers rassled with their income tax returns against the April 15th deadline. Now that that point has been left behind most are turning back with a sigh of relief to their magnifying glass and once more looking for something less deadly to worry about.

Continuous rains through late March created a favorable condition for the citrus grower and a hazardous one for the farmer. There is apparently a heavy citrus crop set and ample moisture to hold it.

Most Valencia crops are still on the trees, and some are unsold as the grower holds out for a still higher price. Me—I'd be skeered!

That good Lyons Fertilizer is still doing the job!

HIGHLANDS AND POLK COUNTIES

R. E. Lassiter, Jr.,
P. O. Box 1304
Winter Haven, Fla.

At this time growers have just about completed their post-bloom sprays in this area. We have lost a lot of foliage from melanose this spring, and we are noticing in some of those blocks that have not been sprayed, that six-spotted mites are further aggravating the leaf drop.

Irrigation of young trees has not been a problem as yet this spring due to the good rainfall. The second application of fertilizer to young trees should be applied shortly. This summer fertilizer application will be well underway in another few weeks. Some growers are wanting to step up the date of this application due to the excessive rainfall this spring.

NORTH CENTRAL FLORIDA

L. D. Geiger, Jr.,
Phone STATE 7-3952
Leesburg, Fla.

The large amount of rain and the high water seems to be the main topic of the talk of the farmers in this area. Much of the truck crops have been ruined by high water as well as many watermelons. Also all the damp weather aids in the spread of disease in all crops.

The citrus growers are busy spraying in between rains and windy days. Melanose and scale also spider and rust mites are the main concern with growers who are only putting on a nutritional spray.

In many places it looks like there may be a very light or at least a spotted crop of early and mid-season fruit. Some growers are hoping for a heavy June bloom but it remains to be seen if it will come.

Dut to the heavy rain some of the growers are planning to fertilize quite a little earlier than they normaily would.

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Uncle Bill Says:

It won't be too long now before another citrus season will draw to a close 'n fer most of our state's growers this has been a mighty good season . . . 'n it looks to us like the growers who produced the finest fruit this year saw this high quality fruit result in bringin' 'em more satisfactory profits than fer a long time.

Indeed, it seems to us that more growers is sincerely interested in producin' the Finest Quality fruit right now, than has bin the case fer a long time . . . and since this sort of fruit is in greatest demand on the market the result this sort of producin' can't help but reflect itself in our pocketbooks . . . 'n they ain't many better reasons that we know of fer raisin' topnotch citrus.

Right now the state legislature is busy, as they are every two years, in makin' laws, worryin' over budgets and taxes . . . and some of the laws they will pass will have direct effect upon us folks who raise citrus, but the folks who has been studyin' ways to improve our citrus laws are folks who are right familiar with the growers problems, so the new laws in the long run should be helpful to all us growers.

Personally, we'll have to plead guilty to havin' a pretty sizeable touch of spring fever, but we reckon we'll git over it by vacation time, then we're plannin' to take time off and rest up a bit fer the next season.

We ain't so tired though that we have forgotten why we had such a good crop this year . . . jist like in years past we proved all over again that Lyons Fertilizers Produce Maximum Crops of Finest Quality.

ment Division at Peoria, Ill., conducts our major programs on the industrial utilization of cereals, soybeans, and linseed. In the very beginning, the industrial process for producing pencillin was developed there. During the Korean War, the Peoria Laboratory also developed the blood-plasma extender known as dextran, which is in military use today. More recently we have been working with dialdehyde starch, a derivative of cereal starches, which has enormous industrial potential in the plastic and paper industries.

At our Eastern Utilization Research and Development Division at Wyndmoor, Pa., research on animal fats has resulted in epoxidized fats, which simultaneously plasticize and stabilize the vinyl resins used to manufacture a host of products for modern living. This laboratory has produced vinyl stearates from the same raw materials. The epoxides alone are already using 30 million pounds of fat annually, and this outlet will increase markedly in the years ahead.

At our Southern Utilization Research and Development Division in New Orleans, we are seeking improved cotton materials which can be tailored chemically to have properties suited for almost any desired end use. This research places cotton in better position to face the intense competition of synthetics. We have made major contributions to the development of wash-and-wear cottons; partially acctylated cotton is finding increasing industrial acceptance; and our improved cotton-precessing equipment is saving millions of dollars annually.

I wish there were time to tell you more of the story of utilization research. I hope, though, that the examples I've given are sufficient to show the potential of this research for developing new and improved markets for the farmers' products in the food. feed, and industrial fields.

Now back to Winter Haven, and the pleasant task that is before us this afternoon. With the continued advice and assistance of your industry committees we intend to keep abreast of farmers' and processors' needs, and to adjust our research program continually to them. Without question, much of our work will be basic in character. To know best how to utilize a crop it is essential to know precisely what it consists of, and what each chemical constituent contributes to the properties of the products derived from it. We know there are hundreds of citrus constituents, but we can name only a small proportion. The new facilities have mentioned, in the hands of capable scientists, will make it possible to illuminate these areas of our ignorance.

We look forward to developing programs of utilization research on vegetables and subtropical fruits with the same substantial industry advice and assistance you have always accorded us in citrus research. We also look forward to continuing the excellent relationship we enjoy with our friends of the State laboratories in Florida and the many other public and private organizations and individuals who are actively engaged in adding still further to the remarkable agricultural progress being made in your State.

With the stronger organization for utilization research now possible here, we will together be better able to serve the agricultural interests of Florida and the other States of the Southeast.

CITRUS NURSERY SITE APPROVED

(Continued from page 16)

burrowing nematode or from a healthy citrus grove which is 15 years old or older, provided there are no visible signs of spreading decline in the grove and random samples from the nearest four rows of trees divulge no evidence of the burrowing nematode. Any replants in the acceptable healthy grove which are within 400 feet of the proposed site must have been in place five years or more, or must have received burrowing nematode certification before movement from a nursery into the grove.

A young grove which meets all requirements otherwise may be approved as a nursery site when it is known that the grove trees were inspected for burrowing nematode and found negative before being moved from a nursery.

Nurseries established before February 1, 1958, may receive site approval without fumigation if the site meets qualifications and the history of the site and of plants brought onto it are known to be satisfactory. If appropriate distances are observed, infested or suspect areas may receive site approval when properly fumigated under supervision of authorized inspectors and the land kept fallow for six months. Proper procedures must be followed after all approvals in order to prevent sites from being disqualified.

All citrus nursery plantings made on unapproved sites or on approved sites which later become disqualified must be hot-water treated before movement from the property.

58 Million Gallons Of Frozen Orange Concentrate In 1958...

Florida citrus processors will pack an estimated 58,000,000 gallons of frozen orange concentrate in retail sizes for the season, Robt. W. Rutledge, Florida Citrus Mutual general manager said in a marketing outlook report of frozen orange concentrate.

He said the marketing outlook for frozen orange concentrate for the balance of the season is favorable.

Last season, 1957-58, processors packed approximately 47,213,000 gallons of frozen orange concentrate in retail sizes.

"Total movement of retail sizes of frozen orange concentrate to June 1, 26 weeks of the marketing season, is estimated to be 30,000,000 gallons," Rutledge said. "Movement for the first 19 weeks was 22,500,000 gallons."

From June 1 to December 1, a period of 26 weeks, total movement of retail sizes of frozen orange concentrate needs to be 26,000,000 gallons, allowing two million gallons for "rebuilding" last season's depleted inventory stocks as of Dec. 1, he said.

From the same 26 week marketing period from June 1 to December 1, American consumers will have available for purchase 90 percent of the 26 million gallons with the balance going into exports to Canada and other countries, government purchases, etc.

"Currently, with the $1.75 FOB quotation per dozen six-ounce cans prevailing, Americans are buying 1,000,000 gallons per week," Rutledge said. "This means consumer purchases, as reported by the Market Research Corporation of America, needs to average 900,000 gallons in retail sizes per week from June 1, spending $4,350,000 for the product each week."

J. R. Graves of Vero Beach, chairman of the Florida Citrus Commission said recently he saw "a new and promising era for Florida citrus" resulting from what he described as "harmony" within the industry, "because of the earnestness of efforts of a great many people" during the past few years.

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SUPERIOR CITRUS TREES—Grown on virgin land, certified nematode-free. Protected by wind machines and fuel for assured delivery. Most varieties available for June and Fall planting. Orders accepted now for REGISTERED PSOROSIS-FREE stock for Fall and Winter delivery. Will bud REGISTERED stock on order for 1960 and later delivery. For further information and quotations call GLendale 2-7541 or write WARD'S NURSERY, INC., BOX 846 — AVON PARK, FLA.

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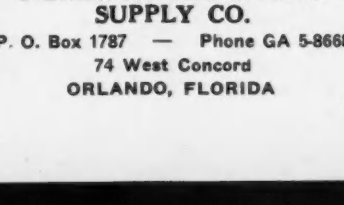

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Hooks Tell Financiers Citrus Future Bright

Gen. Mgr. Homer E. Hooks of the Florida Citrus Commission said in a speech recently that fiscal confidence in Florida citrus has induced many "who are not dazzled by anything but a good solid balance sheet" to put their money in Florida citrus groves.

Speaking before the 12th annual agricultural loan correspondents conference of the Connecticut Mutual Life Insurance Co., meeting at Winter Park, Hooks said "Any food product which is wanted as much as citrus is bound to have a bright future."

He cautioned, however, that success is not automatic.

"It requires hard work, careful planning, good leadership and good judgment," he declared.

The citrus official cited heavy grove plantings in central Florida during the past 10 years, stating "these are expensive investments, not idly made.

"As you well know, many of the people now putting their money into Florida citrus are very hard-headed investors who are not dazzled by anything but a good solid balance sheet," he said. "Their willingness to invest in Florida citrus is in my opinion a cumulative judgment of confidence that cannot be overestimated."

Some people are saying grove prices are too high, Hooks declared, but who is to say at what point they become too high? Prices, he said, must be related to fruit returns.

He explained that Florida Citrus Mutual had predicted average per-acre grower earnings this year, after cultural costs are deducted, will reach $400.

"Based on a per-acre grove cost of $4,000, this is a 10 per cent return on investment, which isn't bad at all, even considering the risks," he stated.

Hooks said average per-acre return to the grower for the past 10 years, was about $170 per acre.

"If you consider a more reasonable grove cost of $2,500 per acre, you have a 10-year return of seven per cent per year, which is still considered good," he said. He admitted the inherent weather risks in citrus require a return on investment above most other types of investment. Yet, he pointed out, the 10-year records of most groves in Florida — including hot, wet, dry, cold and hurricane years — show a fair profit to the owner.

"I think the future of Florida citrus is sound and good," he said. "I think the taste and healthful qualities of oranges and grapefruit are basically desired by almost every person in the world."

Prosperity in the citrus business, he added, is contingent upon "producing economically, shipping efficiently, and marketing profitably."

Hooks explained the Florida Citrus Commission recognizes this continuing problem and has established a Long-Range Planning Committee for just this purpose.

"Activity of this committee was suspended when the freeze hit, but I am going to recommend that it be reinstated," he declared. He said the committee would be reactivated in July.

"We will be projecting Florida citrus five, ten, fifteen years from now, examining citrus land availability, production methods, varietal preferences, packaging and shipping, quality controls, advertising, selling, pricing — in short, everything that can in any way be modified or changed in order to better guarantee present investments and give as much ture prosperity," he concluded.

Florida citrus processors are winding up seasonal operations on the biggest pack of frozen grapefruit concentrate in the industry's history, Robt. W. Rutledge, Florida Citrus Mutual general manager, said last week. He said for all practical purposes processors have completed their frozen grapefruit concentrate pack for this season.

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"We have had excellent control of scale and mites since we've been using ORTHO products," says Jim Dickinson, Production Manager, Wardlow Bros., Frostproof, Fla. (pictured above on left of ORTHO Fieldman Joe Murphy). "ORTHO assures us of top quality grapefruit for the fresh fruit market."

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